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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/562,528	12/28/2005	Xue-Jan Fan	US030215	7980
24737 7590 08/06/2008 PHILIPS INTELLECTUAL PROPERTY & STANDARDS P.O. BOX 3001 BRIARCLIFF MANOR, NY 10510				
EXAMINER				
SMITH, COURTNEY L				
ART UNIT		PAPER NUMBER		
2835				
MAIL DATE		DELIVERY MODE		
08/06/2008		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/562,528

**Applicant(s)**

FAN ET AL.

**Examiner**

COURTNEY L. SMITH

**Art Unit**

2835

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 08 April 2008.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-20 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 28 December 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO/5508)  
4) ☐ Interview Summary (PTO-413)  
5) ☐ Notice of Informal Patent Application  
6) ☐ Other: \_\_\_\_\_  
Paper No(s)/Mail Date \_\_\_\_\_

## DETAILED ACTION

### *Drawings*

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, "a bonding layer" depicted between the substrate and the via must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Objections***

2. Claims 2 & 20, are objected to because of the following informalities: "a bonding layer" in line(s) 2, respectively of each claim is not between the substrate and the via. Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. **Claims 1-7, 12-13**, are rejected under 35 U.S.C. 103(a) as being unpatentable over **(Hagerup 6,477,054)**.

**Regarding Claims 1, 12-13**, Hagerup discloses a device (**Fig. 4**) for thermal management of an integrated circuit device (**24**), the device comprising: a heat sink (**30**); a substrate (**14**) overlying the heat sink; a trace layer (**26**) overlying the substrate; and a via (**40**) extending through the substrate, wherein the via is in thermal communication with the trace layer and the heat sink to transfer to the heat sink at least a portion of any heat applied to the trace layer by the semiconductor. **Except**, Hagerup does not explicitly disclose the circuit device is an LED. It would have been obvious to one having ordinary skill in the art at the time that the invention was made to modify the

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thermal management device with an integrated circuit chip rather than an LED since it was known in the art that both components are semiconductor devices that produce heat.

**Regarding Claim 2, Hagerup discloses a device (Fig. 4) of claim 1, further comprising: a bonding layer (42) between the substrate and the heat sink. It is to be noted that the Examiner is rejecting 'a bonding layer' as depicted in the applicant's Fig. 5, since an objection has been raised regarding the asserted location of the bonding layer.**

**Regarding Claims 3-5, Hagerup discloses a device (Fig. 4) of claim 2, wherein the bonding layer is a thermally conductive tape (as disclosed by Col. 1, lines 40-49) on a multi-layered substrate (as disclosed by Col. 4, lines 62-67; wherein the bonding layer is on multilayered substrate 14).**

**Regarding Claim 6, Hagerup discloses a device (Fig. 4) of claim 1, except explicitly wherein the substrate is a printed circuit board (whereby the disclosed reference 5,604,673 discloses a printed circuit board in Col. 1, lines 30-34).**

**Regarding Claim 7, Hagerup discloses a device (Fig. 4) of claim 1, wherein the substrate is a flexible substrate (wherein the disclosed LTCC tape is flexible, as disclosed in Col. 1, lines 40-49).**

4. **Claims 8-11, 14-20** rejected under 35 U.S.C. 103(a) as being unpatentable over **Hagerup 6,477,054**) as applied to claim 1 above, in view of (**Nakamura 7,054,159**) **Claims 8-11, Hagerup** discloses a device (**Fig. 6**) of claim 1, **except** explicitly disclosing the via includes: a sidewall defining a channel through the substrate, the channel interfacing with the trace layer to thereby establish the thermal communication between the via, trace layer and heat sink. However, **Nakamura** discloses a sidewall (**copper foil--5a-fig. 2**) defining a channel (**5**) through the substrate (**2**), the channel interfacing with the trace layer (**2a, 2b**) to thereby establish the thermal communication between the via, trace layer, and heat sink (**4**). It would have been obvious to one having ordinary skill in the art at the time that the invention was made to provide the device of Hagerup with the via of Nakamura in order to increase the surface area of the via; wherein allowing for more effective heat transfer and bypassing the circuit board.

**Regarding Claims 14-17, Hagerup** discloses a device (**Fig. 6**) of claim 1, **except** explicitly disclosing the via includes: a sidewall defining a channel through the substrate, the channel interfacing with the trace layer to thereby establish the thermal communication between the via, trace layer and heat sink. However, **Nakamura** discloses a sidewall (**copper foil--5a-fig. 2**) including defining a channel (**5**) through the substrate (**2**), the channel interfacing with the trace layer (**2a, 2b**) to thereby establish the thermal communication between the via, trace layer, and heat sink (**4**). It would have been obvious to one having ordinary skill in the art at the time that the invention

was made to provide the device of Hagerup with the via of Nakamura in order to increase the surface area of the via; wherein allowing for more effective heat transfer and bypassing the circuit board.

**Regarding Claims 18-19, Hagerup** discloses a device (**Fig. 6**) for thermal management of an LED (**10**), the device comprising: a heat sink (**51**); a substrate (**17**) overlying the heat sink, a trace layer (**Col. 3, lines 5-9**) overlying the substrate; and a via (**56**) **except** explicitly disclosing the via includes: a sidewall defining a channel through the substrate, the channel interfacing with the trace layer to thereby establish the thermal communication between the via, trace layer and heat sink. However, **Nakamura** discloses a sidewall (**copper foil--5a-fig. 2**) including defining a channel (**5**) through the substrate (**2**), the channel interfacing with the trace layer (**2a, 2b**) to thereby establish the thermal communication between the via, trace layer, and heat sink (**4**). It would have been obvious to one having ordinary skill in the art at the time that the invention was made to provide the device of Hagerup with the via of Nakamura in order to increase the surface area of the via; wherein allowing for more effective heat transfer and bypassing the circuit board.

**Regarding Claim 20, Hagerup** discloses a device (**Fig. 4**) of claim 18, further comprising: a bonding layer (**42**) between the substrate and the heat sink. **It is to be noted that the Examiner is rejecting 'a bonding layer' as depicted in the**

**applicant's Fig. 5, since an objection has been raised regarding the asserted location of the bonding layer.**

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Courtney L. Smith whose telephone number is 571-272-9094. The examiner can normally be reached on Monday-Friday 7:30a-5p (1st Fri. off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jayprakash Gandhi can be reached on 571-272-3740. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/C. L. S./



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/Jayprakash N Gandhi/

Supervisory Patent Examiner, Art Unit 2835